KHASIN, G.A.; MENUSHENKOV, P.P.; PETROV, A.K.; OKHRIMOVICH, B.P.; DAVIDYUK, V.N.; FILATOV, S.K.; VASIL'YEV, P.V.; LOKTIONOV, M.V.; GUREVICH, Yu.G.

New method of mold coating with petrolatum. Metallurg 5 no.5:21-24 My '60. (MIRA 14:3)

1. Zlatoustovskiy metallurgicheskiy zavod i Chelyabinskiy politekhnicheskiy institut.
(Ingot molds) (Petrolatum)

Хасин, С.А.

S/133/60/000/007/007/016

AUTHORS: Voinov, S.G., Candidate of Technical Sciences; Kornorenkov, A.N., Engineer; Petrov, A.K., Engineer; Sokanitskiy, [illegible], Engineer; Markelov, A.[illegible], Engineer; Shalimov, A.[illegible], Candidate of Technical Sciences; Kosoy, L.F., Engineer; Chekhomov, O.M., Engineer; Khasin, [illegible], Engineer

TITLE: The Refining of Alloy Steels by Molten Synthetic Slags

PERIODICAL: Stal', 1960, No. 7, pp. 611 - 619

TEXT: Experiments of refining alloy steels by molten slags in the ladle were made to improve this process. 315 experimental castings were carried out in 10-t and 20-t basic arc furnaces, with ball bearing, structural and stainless steels. The slag was prepared in a 10-t arc furnace (with a 2500 kva transformer) from a mixture of 95 kg lime and 80 kg commercial grade alum earth; the synthetic slag poured into the ladle was about 5 - 6% of the metal weight. Two kinds of slags were used, one for ball bearing steel (А - A) and one for structural and stainless steel (Б - B) with the following composition (the nominators indicate the values before, the denominators after the treatment of the metal):

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Slag	CaO	Al_2O_3	SiO_2	MgO	FeO
A	$\frac{[illegible]}{49.5}$	$\frac{44.4}{42.2}$	$\frac{1.42}{3.54}$	$\frac{1.22}{3.46}$	$\frac{0.18}{0.25}$
B	$\frac{53.6}{50.4}$	$\frac{43.8}{41.5}$	$\frac{[illegible]}{4.32}$	$\frac{1.46}{3.83}$	$\frac{0.19}{0.23}$

The temperature of the slag varied between 1,650°C and 1,750°C. The electric power used in preparing the slag was 150 kwh per 1 ton of steel, this value, however, will not be higher than 90 kwh/ton when using furnaces specially designed for this purpose. The electrode consumption in the smelting furnace amounted to 1.5 kg/ton steel. In the experiments the following steel types were used: ШХ15 (ShKh15), [illegible] ([illegible]), С65А (S65A), 30ХГСА (30KhGSA), 30ХГСНА (30KhGSNA), 40ХНМА (40KhNMA), and У7А-У8А (in 20-t electric furnaces) and 38ХМЮА (38KhMYuA), 35ХНЮА (35KhNYuA), 18ХНВА (18KhNVA), 12Х2Н4А (12Kh2N4A), 12ХН3А (12KhN3A), С[illegible] ([illegible]), 1Х13 (1Kh13) and 1Х18Н9Т (1Kh18N9T) (in 10-t electric furnaces). Several modifications of refining are described: under basic and chamotte slag with different amounts of ferrosilicon and aluminum; with and without deoxidation of the metal and with varying dura-

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tion of the process. Generally it was found that the refining time was reduced by 45 - 50 min for all steel types and the output of the electric furnace could be increased by 10 - 15%. The macrostructure and the fracturing of the tested steel types were found to be satisfactory. The sulfur content decreased to 0.005 - 0.007% with an initial sulfur content of 0.040%. The most considerable desulfuration by synthetic slag was obtained in ball bearing steels (0.003 -0.004%), whereas desulfuration was less intensive in structural steels, in which the sulfur content was 0.001 - 0.003% higher than in ball bearing steels, but still 40 - 50% less than in the conventional type of this kind of steel, with 0.011 - 0.012% S content. It was found that by refining with synthetic slag the amount of sulfide and oxide inclusions could also be reduced. Structural steels of high purity (with regard to inclusions) can be produced by refining with basic slags and when applying diffusion deoxidation. On account of the decrease of the sulfur content and non-metallic inclusions, the mechanical properties, in particular the impact strength and the relative shrinking, are considerably improved in structural and stainless steels. The best results were obtained for the 30KhGSA steel: 5.2 kg-m/cm² and [illegible]%, respectively. These values

are 1.6 times and twice higher than those for the conventional type of this steel. It was also found that the anisotropy of the metal properties decreased: the relation of values for relative shrinkage of transverse and longitudinal specimens increased from 0.62 (of the conventional metal) to 0.79 and 0.85 on the average for the test metal, observed in two variants of the process (variant I and II), whereas the relation of the values for impact strength was raised from 0.55 to 0.77 and 0.74, respectively. It was found that by processing open-hearth steel and converter steel with synthetic slag, according to the method described, the properties of these steel types can be raised to the level of those of electrosteel. The article contains the principal technological data for the test steels, the changes of the sulfur content in the metal and the synthetic slag in the various modifications of refining and the indices of mechanical properties of the structural and stainless steel specimens. There are 6 sets of graphs, 1 diagram, 3 tables and 4 references: 1 Soviet, 1 Swedish and 2 English.

ASSOCIATION: Ukrainskiy institut metallov (Ukrainian Metal Institute)

S/133/60/000/009/003/015
A054/A029

AUTHORS: Khasin, G.A., Engineer and Davidyuk, V.N.

TITLE: News in Brief

PERIODICAL: Stal', 1960, No. 9, pp. 807-808

TEXT: 1. A new method was employed at the Zlatoustovskiy metallurgicheskiy zavod (Zlatoust Metallurgical Plant) for the self-lubrication of ingot molds during bottom pouring. Before the pouring process organic substances (petrolatum, paraffin, stearin, etc.) were fed into the ingot mold which was gradually coated with these substances. The organic material partly burns above the rising level of the metal and has a deoxidizing effect while at the same time coating the walls of the ingot mold uniformly with soot. 2. In the Zlatoust Metallurgical Plant in cooperation with the Institut elektrosvarki im. Ye.O. Patona (Institute of Electrowelding imeni Ye.O. Paton) a method was developed for the purpose of keeping the slag bath which serves as a heat source in a liquid state during the hardening of the casting by conducting through the bath a current (40 v, 1,500 - 1,700 a). This method resulted in the decrease of waste products during the conversion of the castings. 3. When casting open-hearth steel with the addition of silicochrome (Type 20), furnace-ferrosilicon

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News in Brief

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and partly also ferrochrome and 45 %-ferrosilicon could be raplaced. 4. In the checkerwork of regenerators (in the upper IV-XVI rows) a new type of silicate chromate brick was used (Type ЗЛ - ZL), at the Zlatoust Metallurgical Plant. In open-hearth furnaces at a temperature of 1,340°C of the upper checkerwork these bricks have to be replaced after 250-300 castings. 5. In order to decrease the gas-saturation of the metal when casting in basic arc furnaces, non-ferrous manganese was applied during oxidation, while during the period of boiling for preliminary deoxidation an amount of about 10 kg/t pig iron and silicomanganese (about 4 kg/t) were added. After careful removal of the oxidizing slag the necessary amount of aluminum required for the alloy was added. The refining slag was about 2-2.5 % of the charge. The quality of the experimental casting was satisfactory, the melting time was shortened and the power consumption was reduced. 6. Pulverized nickel suboxides, with a Ni content of 79-80 %, were used when casting 40 ХН (40KhN), 12-20ХН3А (12-20KhN3A), 17ХН2 (17KhN2), 20Х2Н4А (12-20Kh2N4A), 30-37ХН3А (30-37KhN3A), 15ХГНТА (15KhGNTA), 12-Martin steels and 1Х18Н9Т (1Kh18N9T) type electrosteel without any difficulty and without causing any deterioration of the quality. Nickel suboxides can be utilized almost entirely; however, in the open hearth furnaces the consumption of pig-iron increased to some extent and in electrofurnaces the time of

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casting was lengthened by about 25 minutes. In spite of this fact the use of nickel suboxide instead of nickel metal saves 2,700 rubles per ton of suboxide consumed. 7. The possiblities of establishing a technology for the production of the 20ХГНР (20KhGNR) boron-containing steel were investigated. It was found that this kind of steel can satisfactorily replace the more expensive 20ХН3А (20KhN3A) type steel. In deoxidation aluminum (1kg/t), titanium (0.06 %) and boron (0.003-0.004 %) not counting cinder should be applied.

S/133/60/000/010/009/013
A054/A029

AUTHORS: Khasin, G.A., Engineer; Davidyuk, V.N.

TITLE: News in Brief

PERIODICAL: Stal', 1960, No. 10, pp. 934 - 935

TEXT: In order to examine hot drawing of high-alloy steels of low plasticity (P18, P9, X18 = R18, R9, Kh18), tests on a laboratory scale were carried out in the Zlatoustovskiy metallurgicheskiy zavod (Zlatoust Metallurgical Plant) to determine the mechanical properties during extension. It was found that below 600°C the strength of these steel grades changed only slightly, whereas above this temperature the change came very suddenly. Maximum plasticity in Kh18 steel was obtained in the temperature ranges between 150 - 170°C and 325 - 350°C, in R18 steel between 260 - 320°C. In the tests on an industrial scale the packets were heated before reaching the drawing die with the aid of a transformer of 45 kw (380/25 v, 1,500 amp); two drawing dies were applied, the drawing rate was 46 and 10 m/min. The efficiency of hot drawing was proved mainly for steels which did not deform easily. When cooling rods of 1X18H9T (1Kh18N9T) type steel rapidly after rolling from 970 - 1,020°C for 9 - 17 sec, the steel obtained the

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News in Brief

S/133/60/000/010/009/013
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mechanical properties required without any subsequent heat treatment, which resulted in a considerable saving. It was found that during cold drawing fractures occured in some types of steel, mainly in those in which the carbon and the chrome content were near the upper limit of the prescription. X-ray analyses revealed that the high degree of brittleness had to be put down to the presence of trigonal carbide (Cr_7C_3), the microhardness of which is 2,100 kg/mm², beside the usual cubical carbide ($Cr_{23}C_6$) having a microhardness of 1,650 kg/mm². Tests on an industrial scale showed that a long period of heating before rolling deteriorates the plastic properties of steel and results in rupture during drawing. This can be prevented by subjecting the steel to a recrystallizing tempering at 740°C after every reduction, with a subsequent rapid cooling in water. Laboratory tests showed that У10ХНМ (U10KhNM) and 45ХНМФА (45KhNMFA) types of steel were suitable for the production of rollers. The 45 KhNMFA type rollers displayed a greater strength than those made of "50" types of steel. The surface hardness of the 45KhNMFA type steel rollers could further be improved by increasing the velocity of cooling after their normalization with subsequent tempering. In order to make the bite smoother with the 45KhNMFA steel rollers, the calibration should be modified or the strip should be introduced in a coercive manner under the roller.

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S/133/60/000/010/012/013
A054/A029

AUTHORS: Khasin, G.A., Engineer; Davidyuk, V.N.

TITLE: News in Brief

PERIODICAL: Stal', 1960, No. 10, p. 953

TEXT: 18 types of steels were examined for deformation-resistance in the Zlatoustovskiy metallurgicheskiy zavod (Zlatoust Metallurgical Plant) in cooperation with the UPI. The temperatures varied between 800 - 1,250°C and the deformation rates were 0.007; 0.05; 7.5 and 150 sec^{-1} during expansion and compacting. It was found that deformation-resistance depended on the chemical composition of steel, temperature, degree and rate of deformation and increased in proportion with the amount of alloying elements. The tests belong to two groups as far as the change in plasticity in the temperature range between 800 - 1,200°C is concerned. In the steels of the first group the plasticity increases continuously, in those of the second group only to a limited extent, beyond which it displays a decreasing tendency and this must be taken into account when establishing a technology for hot conversion of these steels. Methods to obtain the required mechanical properties of high-chrome ferrite steels of the Х25 (Kh25) 18

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type were developed. The indices of plasticity in these steels as prescribed by ГОСТ (GOST) 5949-51 are obtained, when forging starts at a temperature not above 1,050°C and comes to an end in the temperature range of 700 - 800°C. An adjusting heat treatment can be applied for billets with a diameter of 80 mm, with heating at 780°C for 5 h and water cooling and for billets having a diameter of 90 - 100 mm of X17 (Kh17) type steel with heating at 750 - 780°C for 5 h and cooling on air. Program control of temperatures in the oil-fueled heat treating furnaces was experimentally investigated in the Zlatoust Metallurgical Plant in cooperation with the Chelyabinsk branch of the Vostokmontazhavtomatika ЭПП-120 (EPP-120) type electronic potentiometers were applied, which were readjusted slightly: in the device the transmitter of the time pattern control of temperature was inserted, consisting of two disks, connected with the cable transmission; one disk was mounted on the driving shaft of the diagram paper of the potentiometer, while the second disk was set on a driving shaft of the profiled pattern. The system works satisfactorily and has the advantage over the ПРП-178 (PRP-178) type potentiometer that the pattern can be changed in 1 min without having to disassemble the device.

S/148/60/000/012/005/020
A161/A133

AUTHORS: Tarnovskiy, I. Ya.; Khasin, G. A.; Pozdeyev, A. A., and Meandrov, L. V.

TITLE: Plasticity of some steel grades at high temperatures

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no. 12, 1960, 63 - 69

TEXT: The conventional laboratory methods can only give indirect data on the plasticity in relation to one of the multitude of factors existing in real pressure working processes. It is therefore often better to use the simplest test methods - tension and impact bending. Eighteen alloy steel grades of different structure groups and applications have been tested using these common heat tests. The results are presented in tables and graphs. The 18 grades are divided into two groups - "a" and "b" (The chemical compositions are not included). The "a" includes: "45"; У12А (U12A); 60С2 (60S2); 18ХНВА (18KhNVA); ШХ15СГ (ShKh15SG); 1Х18Н9Т (1Kh18N9T); 4Х13 (4Kh13); Х17Н2 (Kh17N2); Х18Н12М2Т (Kh18N12M2T); Х18Н25С2 (Kh18N25S2); Х25Т05 (Kh25105); and the "b" - Р18 (R18); Х23Н18

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(Kh23N18); 1X13 (1Kh13); 4X14H14B2M (4Kh14N14V2M); ЭИ-481 (EI-481). Relative elongation (δ, %) follows two different laws: a continuous rise from 800 to 1,200°C (Fig. 1, a), and a rise to a maximum and drop after it (Fig. 1, b). A common feature of the "b" group, except for Kh23N18, is the high carbide content. In the Kh9S2 grade δ changes peculiarly (Fig. 1, c) - drops to almost a half and rises rapidly after the minimum at 900 - 1,100°C. Reduction of area (ψ, %) follows the same law but with less varying absolute values. In the "a" group grades the ψ grows continually (or stays at 100%), and in the "b" group it reaches the maximum at 1,000 - 1,100°C and goes down. An intense grain growth in the 900 - 1,100°C range is characteristic for silchrome steel. In most of the steel grades ψ reached 100% at 1,200°C or earlier, and in some cases it did not exceed 80-90%. Consequently, the trend of the plasticity indices δ and ψ at high temperatures is practically the same, and they are equivalent until the formation of the neck on specimens, but after it the ψ value gives a more complete plasticity characteristic. Nevertheless, both factors should be considered in combination. The "a" group steel has the highest plasticity through the whole temperature range of hot pressure working, but it must be born in mind that in complex stress conditions (e.g., tube piercing), the properties might be different, as well as that the obtained δ and ψ values might not be true for 1Kh18N9T, Kh18N12M2T and Kh17N2 in the case of a high ferrite content. Particular care is recommended in selecting the process parameters (temperature in particular) for the "b" group, for a large part of these grades contains a high quantity of primary carbides and includes low-melting eutectics in the cast structure. The impact strength (a_K) drop with raising test temperature from 800 to 1,250°C was common for all investigated steel grades (Fig. 2). All grades (except Kh23N18) with a_K varying as 1 were the most plastic, the specimens bent without rupture; grades with an impact strength varying as 2 broke in tests with only few exceptions; they belonged to the group "b" in tension tests. The conclusion is that impact strength variation is opposite to the plasticity variation at a high temperature range and cannot be used for the plasticity indices in this case. It must always be evaluated jointly with deformation resistance test results in equal test conditions. The obtained data can be used to determine the optimum temperature range for different steel grades, as well as for subdividing the grades into groups for similar technological treatment. A further systematization of test data is advised. There are 3 tables and 2 figures.

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S/148/60/000/012/005/020
A161/A133

Plasticity of some steel grades at...

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)

SUBMITTED: March 22, 1960

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S/133/60/000/C12/005/015
A054/A027

AUTHORS: Gurevich, Yu. G., Engineer, Rozin, B.B., Engineer, Geyfman, R.S., Engineer, Khasin, G.A., Engineer, and Okhrimovich, B.P., Engineer

TITLE: Pouring 1X18H9T (1Kh18N9T) Type Steel in Ingot Molds Coated ith Petrolatum

PERIODICAL: Stal', 1960, No. 12, pp 1096-1098

TEXT: Since 1959, the Zlatoust Metallurgical Plant, when melting the 1Kh18N9T brand steel by bottom casting, has applied petrolatum instead of carbontetrachloride for the "self-coating" of the 2.7 ton ingot molds without changing their form and their weight. In the establishment of the new technology, P.P. Menushenkov, A.K. Petrov, S.K. Filatov, P.I. Vasil'yev, V.N. Davidyuk, and M.V. Loktionov took part. The smoothness of the ingot surface was assessed by the specific labor spent on removing surface defects from 1 sq m of the metal (by reference to photochronometric observations) and the test results were analyzed by computers. Altogether 472 tests were carried out in the course of which the influence of several factors: temperature, holding time of the metal in the ladle, the velocity of pouring into the ladle, were investigated, for both kinds of coating separately.

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S/133/60/000/012/005/015
A054/A027

Pouring 1X18H9T (1Kh18N9T) Type Steel in Ingot Molds Coated With Petrolatum

The tests showed that when the 2.7 ton ingot molds were coated with petrolatum (maintaining the conventional technology used for the 1Kh18N9T brand steel in other respects) the surface of the improved and the time required for removing surface defects decreased by 15-20%. As regards the time required for defects removal, the following data were obtained in two shops:

A/

Temperature:	$< 1{,}550°C$	$1{,}580-1{,}600°C$	$> 1{,}600°C$
with petrolatum coating, min/m^2	40.1	51.0	88.7
with CCl_4 coating "	77.5	66.0	68.9

B/

with petrolatum coating, min/m^2	100.8	100.9	113.0
with CCl_4 coating "	117.1	134.0	148.7

These figures show that petrolatum coating is superior to CCl_4 coating under 1,600°C. The relationship between the quantity of metal to be subsequently scoured and the time of pouring into the ladles coated with petrolatum was also investigated and it was found that if the pouring time was under 2 minutes, 40 and 71% of the metal had to be subsequently scoured, if between 2-3 minutes:

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S/133/60/000/012/005/015
A054/A027

Pouring 1X18H9T (1Kh18N9T) Type Steel in Ingot Molds Coated With Petrolatum

26.0-55.5% and above 3 minutes: 0.0- 31.8% (the first figures stand for Shop A, the second for Shop B). These data show that if the pouring time is shorter the ingot surface deteriorates rather suddenly, which can also be proved by the defects removal times in function of pouring time:

Pouring time, min	< 2	2-3	> 3
Average cleaning time, min/m^2			
shop A			
with petrolatum coating	60.4	46.9	35.5
with CCl_4 coating	78.0	75.5	45.7
shop B			
with petrolatum coating	116.0	109.2	95.0
with CCl_4 coating	129.0	145.4	114.0

Thus, when pouring time is longer than 2 minutes, the labor required for cleaning the ingot surface decreases by 25%. Tests carried out on the same subject in roll shops yielded analogous results. There are 3 figures and 4 Soviet references.

ASSOCIATION: Zlatoustovskiy metallurgicheskiy zavod (Zlatoust Metallurgical Plant), Chelyabinskiy politekhnicheskiy institut (Chelyabinsk Polytechnical Institute).

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VOINOV, S.G., kand.tekhn.nauk; KORNEYENKOV, A.N., inzh.; PETROV, A.K.; BOKSHITSKIY, Ya.M.; MARKELOV, A.I.; SHALIMOV, A.G., kand.tekhn.nauk; KOSOY, L.F., inzh.; CHEKHOMOV, O.M.; KHASIN, G.A.

Refining of alloyed steels by molten synthetic slags. Stal' 20 no. 7:611-618 Jl '60. (MIRA 14:5)

(Steel--Electrometallurgy)

KHASIN, G.A., inzh.; DAVIDYUK, V.N.

Experimental introduction of programmed automatic temperature control in heat treating furnaces. Stal' 20 no.10:953 O '60. (MIRA 13:9)
(Furnaces, Heat-treating) (Automatic control)

GUREVICH, Yu.G., inzh.; KOZIN, B.B., inzh.; GEYFMAN, R.S., inzh.;
KHASIN, G.A., inzh.; OKHRIMOVICH, B.P., inzh.

Pouring 1Kh18N9T steel with petrolatum coating of ingot molds.
Stal' 20 no. 12:1096-1098 D '60. (MIRA 13:12)

1. Zlatoustovskiy metallurgicheskiy zavod i Chelyabinskiy politekhnicheskiy institut.
(Steel ingots) (Petrolatum)

KACHANOV, N.N.; SPRISHEVSKIY, A.I.; KHASIN, G.A.; BERNSHTEYN, M.L.

What should a modern metallographic microscope be like?
Zav.lab. 26 no.6:770-773 '60. (MIRA 13:7)

1. Nauchno-issledovatel'skiy i eksperimental'nyy institut podshipnikovoy promyshlennosti (for Kachanov and Sprishevskiy). 2. TSentral'naya zavodskaya laboratoriya Zlatoustovskogo metallurgicheskogo zavoda imeni I.V.Stalina (for Khasin). 3. Moskovskiy institut stali im. I.V.Stalina (for Bernshteyn).

(Microscope)

S/032/60/026/010/033/035
B016/B054

AUTHOR: Khasin, G. A., Chief

TITLE: At the Central Laboratory of the Zlatoust Metallurgical Works

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol. 26, No. 10, pp. 1186 - 1188

TEXT: The author reports on the realization in his laboratory of the resolutions adopted by the Plenary Meeting of the TsK KPSS (Central Committee of the Communist Party of the USSR) of July concerning the assignment of a greater role to science in technical progress and a quicker introduction of scientific achievements in factories. The staff of the Central Laboratory successfully cooperates with the works departments, as well as with scientific research institutes and schools. Among other things, the author's factory, in cooperation with the Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (TsNIIChermet) (Central Scientific Research Institute of Ferrous Metallurgy), improved A. S. Tochinskiy's method of treating alloy steels with

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At the Central Laboratory of the Zlatoust Metallurgical Works S/032/60/026/010/033/035 B016/B054

liquid synthetic slag, and pointed out the conditions for the introduction of this method in metallurgy. On the basis of electro-slag welding, the institut im. Patona (Institute imeni Paton) designed a new steel-making unit: the electro-slag remelting furnace. The properties of the metal remelted in this furnace are being studied. The new procedure is based on the same principle: electro-slag additional feeding of the deadhead (pribyl'noy) part of the ingot. This procedure aims at a compensation of shrinkage during the solidification of steel. The corresponding apparatus uses, as one of the electrodes, waste pieces of molten steel. Silicochrome and nickel monoxide instead of metallic nickel, as well as differently combined and concentrated complex deoxidizers, are used for oxygen steel melting. The principles of micro-alloying steel with boron were worked out at the author's factory together with the TsNIIChermet. A similar study with zirconium steels is planned. An ingot configuration which permits the production of metal of higher quality was developed at the author's works. New types of thin-walled molds were designed for large ingots. They ensure a good metal quality, and reduce the specific consumption of crude iron per 1 ton of steel considerably. A group of engineers of the works developed

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At the Central Laboratory of the Zlatoust Metallurgical Works

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B016/B054

a new method of lubricating the molds with organic substance (petrolatum) by which the surface of liquid steel is protected from oxidation. At present, the works together with the Nauchno-issledovatel'skiy institut tokov vysokoy chastoty (Scientific Research Institute of High-frequency Currents) is working at the induction method of heating semi-finished steel before rolling. The improvement of known, and the invention of new methods of surface cleaning (especially electrical ones) are being studied. Cracking is prevented by isothermal refining of the hot-worked metal. The process of precipitation of the carbide net in the cooling metal is accelerated by means of semiautomatic cooling machines. This improves the plastic properties of hypereutectoid tool steel. New die steels of higher quality were developed. Faster control methods were introduced, e.g., by pneumatic-tube transport of samples to the laboratory.

ASSOCIATION: Tsentral'naya laboratoriya Zlatoustovskogo metallurgicheskogo zavoda (Central Laboratory of the Zlatoust Metallurgical Works)

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S/148/61/000/003/006/015
A161/A133

AUTHORS: Tarnovskiy, I. Ya., Pozdeyev, A. A., Meandrov, L. V., Khasin, G. A.

TITLE: The dependence of the deformation resistance on the ductile properties of steel in hot pressure working

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no. 3, 1961, 82 - 90

TEXT: Tests have been carried out with the upsetting of 16 different steel grades at 900 - 1,200°C and three different deformation rates: 0.05; 7,5 and 150 sec^{-1}. The article presents details of the experiment techniques, the data obtained in the form of graphs, and derivations of formulae. The graphs present the real stress value variations with the deformation degree, as well as with deformation rate at different temperatures. The growth of deformation resistance (i.e., hardening) of some steel grades at 1,100 - 1,200°C, and a low deformation rate were found to be so insignificant that the yield limit or ultimate strength could be used as deformation resistance characteristic, but at high deformation rates the steel behaviour was different, and the conclusion was drawn that the effect of the deformation degree should by all means be taken into account for all the steel types studied. The increase in the deformation rate also considerably raised the de-

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formation resistance. A formula was derived that expresses the behavior of the majority of the 16 steel grades with sufficient accuracy:

$$\sigma_{лп} = \sigma_0^{\prime} + K \ln \left(1 + \frac{\xi_n}{\xi_0}\right) \qquad (2)$$

where $\sigma_{лп}$ is the deformation resistance during linear stressed state and ξ_0 rate; $\sigma^{\prime}$ - the deformation resistance at zero deformation rate; ξ_0 - the deformation rate during static tests; ξ_n - any deformation rate; K - a coefficient that depends on the steel grade, temperature and deformation degree, in kg/mm^2. The coefficient presents in a physical sense the "tough resistance of metal to deformation". Its connection with the toughness factor is analysed; and a table is included giving the numerical values of K and $\sigma^{\prime}$ calculated for two of the studied steel grades (at different temperatures and deformation rates) - 18ХНВА (18KhNVA) and Х18Н12М2Т (Kh18N12M2T) steel. It is pointed out that the simplified ductility equation for flat employed usually in pressure working theory

$$\sigma_1 - \sigma_3 = 1.15\sigma_s \qquad (5)$$

does not sufficiently express the real properties of steel at high temperatures. The new equation of tough-ductile state derived from experimental data is

$$\sigma_1 - \sigma_3 = 1.15\sigma'_s + 4\mu'_{mean}|\xi_1| \qquad (6)$$

where μ'_{mean} is the mean (for the entire body volume) value of the toughness coefficient at the given deformation moment, and σ'_s - the extrapolated yield limit that accounts at any given moment for the degree of the preceding deformation of the body. Equations are derived also for the case of any stressed state. The numerical values of the K coefficient render it easy to find the toughness coefficient for heated steel also under different deformation conditions. There are 7 figures and 4 Soviet-bloc references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (The Ural Polytechnic Institute)

SUBMITTED: July 20, 1959

S/130/61/000/004/004/005
A006/A001

AUTHORS: Khasin, G.A., Chikina, V.G.

TITLE: Production of Calibrated Ball Bearing Steel

PERIODICAL: Metallurg, 1961, No. 4, pp. 23 - 26

TEXT: At the Zlatoust Metallurgical Plant calibrated ball bearing ШХ 9 (ShKh9), ШХ 15 (ShKh15) and ШХ15СГ (ShKh15SG) steels of 10 - 53 mm size are produced. For 48 mm shapes, 85 mm square blanks are employed, and 120 mm squares for shapes of over 48 mm. Prior to rolling the blanks are etched, cleaned with abrasive disks, and preheated in continuous furnaces up to 1,080°C. During the rolling process the quality of the rolled stock surface is inspected. Cooling of the rods after rolling, down to 900 - 700°C eliminates overannealing of the carbide network. Black annealing of ball-bearing steel is made in chamber type furnaces with extensible floors and in furnaces with external mechanization. The sprayers are one-side arranged; pressure and temperature are automatically controlled. Conditions of black annealing in furnaces with extensible floors are: heating to holding temperature at a rate of 10° per minute; holding at 760°C for 1 hour; at 770°C for 2 hours; at 780°C for 4 hours and at 790°C: 4 hours for

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Production of Calibrated Ball Bearing Steel

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A006/A001

ShKh9 steel; 6 hours for ShKh15 and 8 hours for ShKh15SG steel. Stepped annealing assures satisfactory and uniform heating of the metal and good operation of the sprayers. The metal is cooled at a rate of 40° per hour down to 700-720°C with isothermal holding and subsequent cooling to 600-550°C (Figure 1). Prior to drawing the metal is immersed to remove the scale from the surface. The remaining scale is eliminated in rotating drums and by etching. The rods are then coated with a sodium nitrite aqueous solution heated to 60 - 70°C for 15 - 20 minutes. Cold drawing is made with 1 - 2 mm reduction depending on the diameter of the initial blank. Savings in metal and higher efficiency are obtained by mechanical pressing of the rods into draw plates (Figure 2). The rod is clamped in a carriage, whose reciprocating motion is produced by levers which are driven by a crosshead and pull rods. The use of this device yields savings of metal attaining 60 - 70 mm per length of each rod. Bright annealing is made in rectangular electric cupola furnaces of the ОКБ-426 (OKB-426) type using commercial nitrogen as shielding atmosphere. The furnace operation was unsatisfactory although some improvements were tried. Therefore it has been decided to replace these furnaces by induction furnaces. Actually, bright annealing of calibrated steel is performed in pipes at 720°C for 12 hours, and with air cooling. About 1 ton of calibrated rods are placed in the pipes which are sealed at one end. The shielding

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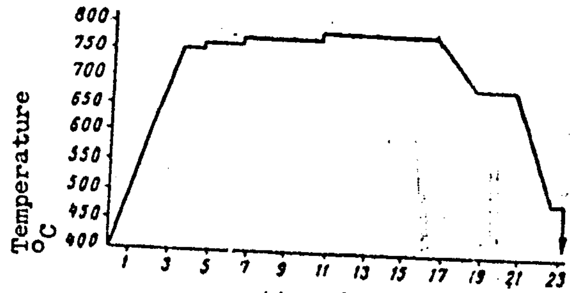
atmosphere inside the pipe is produced with a mixture of fresh cast-iron chips and charcoal. After the rods have been placed in the pipes the open ends are sealed too. The quality of annealed metal is checked. Exceedingly decarbonized metal is subjected to repeated oxidizing annealing at 750 - 770°C with air excess in the furnace at the expense of negative pressure and by opening the air slit of the sprayers. This heat treatment assures the correction of 97% of metal rejected due to unsatisfactory decarbonization. The technology described in producing ball bearing steel yields 92.3% ShKh9 and ShKh15, and 91.3% ShKh15SG steel out of the given amount of rolled stock.

Figure 1

Graph showing black annealing of ShKh15 steel



S/130/62/000/002/005/005
A006/A101

AUTHORS: Khasin, G. A., Chikina, V. G., Bogdashkin, A. I., Rannev, G. G., Bruns, G. L., Vashchenko, Yu. I.

TITLE: A unit for the hot drawing of hard-to-deform steels

PERIODICAL: Metallurg, no. 2, 1962, 33 - 35

TEXT: At the Zlatoust Metallurgical Plant a unit for the hot drawing of hard-to-deform steels was developed and put into operation. It consists of a drawing mill, type I/750M, a tubular furnace to preheat the wire and a device for measuring the wire temperature during drawing. The wire is preheated in the tubular furnace by passage through molten lead and a charcoal layer. The capacity of the furnace is 75 kw, feed voltage 380 v, and the amount of lead 2,000 kg. The lead level remained almost unchanged after the calibration of over 100 tons high-speed steel; the wear of the draw plates is about 0.01 mm per 1 ton of wire. The wire temperature when leaving the draw plate is controlled by an infrared photo-electric pyrometer developed by NIIM, being able to measure temperatures within a range of 200 - 500°C. The pyrometer is combined with an electronic potentiometer ЭПП-120 (EPP-12). The least wire diameter during the measurement

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S/133/62/000/004/001/008
A054/A127

AUTHORS: Sergeyev, G.N.; Khasin, G.A; Davidyuk, V.N., Engineers

TITLE: Casting flat alloy-steel ingots

PERIODICAL: Stal', no. 4, 1962, 309 - 312

TEXT: Besides other defects, alloy-steel and alloy ingots of the conventional square and circular section type very often have an insufficient density, mostly in the axial zone. This is caused mainly by an increased carbon content, the presence of alloying elements, impurities in the form of high-melting non-metallic inclusions and an increased gas saturation of the metal. In the bottom part of the ingot the density is usually satisfactory, due to the accelerated solidification of the metal caused by intensive cooling from the sides and from the mold bottom. Evidently, the axial porosity of the ingot can, therefore, be reduced by modifying the solidification conditions of the metal accordingly: by an increase of the heat extraction from the ingot bottom which intensifies solidification from the bottom upward or by a more thorough heating of the ingot head. These conditions can be ensured partly by a change of the ingot geometry (greater conicity, smaller height-to-average cross section ratio, larger dead head volume) and, partly, by a more intense heating of the head. The most favorable conditions for obtaining a uniform, dense macrostructure are given in the electroslag remelting process. At the Zlatoustovskiy metallurgicheskiy zavod (Zlatoust Metallurgical Plant) tests were carried out to cast ingots requiring a uniform macrostructure. The test ingots were shorter, their height-to-cross section ratio was considerably smaller (1,65) than in the conventional ingots, their conicity was greater (up to 10%), which promotes crystallization from the bottom upwards; the weight of the liquid metal in the head was greater (up to 37% of the total ingot weight). Under these conditions the pores forming are easily filled with liquid metal and this ensures a higher density in the axial zone of the ingot. The shorter ingot shape, however, involves other difficulties: larger parts must be cropped, the yield of first-grade steel decreases, heating, forging and rolling are more difficult. Shortened ingots are, therefore, cast only in special cases (large section rods from certain steel grades and alloys). To obtain a uniformly dense macrostructure under more favorable conditions, cooling has to be accelerated. This can only be achieved, however, by an increase of the cooling surface in relation to the volume-unit of the solidifying metal, in other words, by a reduction of the ingot thickness. At the Zlatoust Metallurgical Plant 0.75-ton, 500 x 250 mm test ingots were cast, with a 135-kg riser, having the following characteristics (in brackets the corresponding data for conventional, 430-mm circular ingots):

Ingot weight (ton)	0.75 (0.7)
Riser weight-to-total ingot weight ratio (for liquid metal, %)	18 (37)
Conicity of the ingot (sidewise) %	5.63 (10.8)
Ingot height-to-average section ratio	2.32 (1.64
Lateral cooling surface-to-ingot volume ratio (without bottom part) dm^2/dm^3	1.16 (0.97)
Mold weight-to-ingot weight ratio (without riser)	2.29 (2.54)

The new geometry of the ingots permits a more rapid solidification. The axial zone of Р 18 (R18), ЭИ 736 (EI736), ЭИ 961 (EI961) steel ingots is fine-grained and dense; when flat, 0.75 ton R-18 high-speed steel ingots were converted into

S/133/62/000/004/001/008
A054/A127

Casting flat alloy-steel...

rods at least 50 mm in diameter, the carbide non-homogeneity could be reduced to the standard degree [ГОСТ 5951-51 (GOST 5951-51)]. When flat R18, R9 and EI347 ingots were cast with petrolatum, their surface was greatly improved. The EI736 ingots, which usually have intergranular cracks and slag-inclusions in the conventional and shortened ingots, are free from these defects when they have a flat shape. There are no difficulties in heating, forging and rolling them. High-alloy steels and alloys should be cast into flat ingots of not more than 1 ton. For less alloyed steels an optimum configuration of heavy-weight flat ingots has to be developed and tested. There are 2 figures.

ASSOCIATION: Chelyabinskiy sovnarkhoz (Chelyabinsk Sovnarkhoz)

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S/133/62/000/006/001/015
A054/A127

AUTHORS: Khasin, G. A., Davidyuk, V. N., Engineers

TITLE: At the Zlatoustovskiy metallurgicheskiy zavod (Zlatoustovsk Metallurgical Plant)

PERIODICAL: Stal', no. 6, 1962, 518 - 520

TEXT: ЛК-6 (LK-6) light-weight bricks, containing kaolin, sawdust and lignine are used for lining the extension pieces of 3.6-ton stainless steel ingots. Since they have been introduced, the head crop could be reduced by 2%. The riser for 4.6-ton open-hearth steel ingots was lined with a mixture containing 36% non-calcined vermiculite, 14% aluminum, 10% ferrosilicon (of 45%), 40% charcoal, small coke and 10% of ПАМ-4 (PAM-4) powder above 100%. 1.5 kg mixture was used for 1 ton of liquid steel. In another version 3 kg calcined vermiculite was added to 1 ton of steel; this version was more effective. 2) In co-operation with the Satkinskiy institut ogneuporov (Satkinsk Institute of Refractory Material) a method has been developed for ramming the hearth bottom, using a mixture of crushed magnesite powder and 3 - 5% titaniummagnetite concentrate. This method

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At the Zlatoustovskiy... S/133/62/000/006/001/015
A054/A127

reduced the magnesite powder consumption for electric steel smelters by 3 - 6 kg/ton of steel. 3) When using petrolatum (0.3 kg/ton) in smelting 1X18H9T (1Kh18N9T) grade steel, the ingots can be delivered for rolling in hot condition and the yield of flawless product increases; the depth of roughing the 1Kh18N9T tube blanks can be reduced from 10 to 5 mm. This increases the flawless output by 7%. 4) In co-operation with the Ural'skiy institut chernykh metallov (Ural Institute of Ferrous Metals) new slags for smelting carbon steels in basic open-hearth furnaces were tested. One composition contained 17 - 85% mervinite ($3CaO \cdot MgO \cdot 2SiO_2$) and orthosilicate, the balance consisting of spinel [$(Mg, Mn, Fe)O \cdot (Al, Fe, Cr, Mn)_2O_3$] and RO-phase (Fe,Mn,Mg oxides). For chrome-molybdenum steels the percentage of the first two constituents was 61 - 73, that of the latter 25 - 28. 5) In cooperation with the Institut elektrosvarki im. Ye. O. Patona (Electric Welding Institute im. Ye. O. Paton) the electroslag refilling method for electrosteels was investigated. 570 half-ton ingots were tested under the following conditions:

Duration of refilling, min.	0 - 5	5 - 8	8 - 18
Current, a	1,000	600	200

The best flux was the AHΦ -6 (ANF-6) brand, preheated to 600 - 800°C; the best

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material for lining the extension pieces was chamotte. 6) The 3.6-ton electric steel ingots were poured in thin-walled (90 mm) molds, (the mold weight to ingot weight ratio, without riser, was 0.945). As compared with conventional 2.7-ton ingots, the macrostructure of 18 ХНВА (18KhNVA), ШХ15 (ShKh15) and 1Х18Н9Т (1Kh18N9T) grades was denser, it was satisfactory also after deformation. 7) Rejects due to spot formation were reduced by modification of the smelting technology of 35 ХЮА (35KhYuA) and 38 ХМЮА (38KhMYuA) steels. At the beginning of "clean" rimming 10 kg/ton pig iron, silicomanganese and 45-% ferrosilicon (in amounts of 3 - 4 kg/ton), aluminum (1 kg/ton) are added and then the required amount of ferrochrome. After chrome is smelted, the oxidizing slag is tapped and the 0.08 - 0.14% silicon containing metal alloyed with aluminum and kept under lime-fluorspar slag for 30 minutes. 8) The technology for producing СВ04Х19Н9 (SV04Kh19N9) and СВ06Х19Х9Т (SV06Kh19N9T) steels was introduced. Smelting takes place in basic electric furnaces, on carbon steel scrap, with oxidation and remelting of alloy steel scrap; oxygen is blown through the bath. Chrome, nickel and manganese are added in amounts within narrower limits than usual (18 - 18.8%, 9.5 - 10%, 1.3 - 2% respectively); petrolatum (0.3 kg/ton) is used. 8) 08Х20Н10Г6 (08Kh20N10G6) steel is smelted in basic arc furnaces with oxidation or remelting alloy steel scrap. Carbon, manganese, chrome and nickel are added within narrower limits (0.08 - 0.1%, 6 - 7%, 20 - 20.7%, 10.5 - 11% respectively). The carbon content should not exceed 0.05% at the end of the oxidizing period. Deoxidation takes place with 10 kg/ton siliconmanganese and 1 kg/ton aluminum lumps. Prior to tapping ferrotitanium is added in an amount to obtain 0.2% Ti in the finished steel. 9) To increase the ductility of H -42 (N-42) steel during forging the smelting process was changed. In one of the versions tested the bath was first reduced with pig iron (5 kg/ton), ferromanganese (1.6 - 4.5 kg/ton) and aluminum (0.3 kg/ton), after the iron ore was charged. In the second version, the pig iron was added with the current switched off, a "secondary" rimming was caused, while the electrodes were immersed in the bath for 1.5 - 12 seconds. The samples of the second version showed a higher ductility. 30 - 40 minutes after the beginning of refining, 0.5 kg/ton aluminum lumps and before tapping, again 1 kg/ton aluminum were added. The second version was adopted. 10) To improve the smelting technology of the У7АВ (U7AV) and ЭИ474 (EI474) steel grades, sulfur is added immediately after tapping the oxidizing slag; refining takes place under chamotte slag, by oxidizing it first with crushed coke and next with 75-% ferrosilicon. 11) Square and circular molds were

At the Zlatoustovskiy...

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A054/A127

tested for the electroslag remelting process. In the square copper molds (430 x 430 mm in size), with spraying cooling system, ШХ15 (ShKh15) grade, 2-ton ingots were remelted, at 60 v and 850 - 900 kw, applying АНФ-6 (ANF-6) flux; remelting took an average of 6.5 hours. The ingots were rolled on the 950 stand without finishing; the electroslag remelted steel had a dense macrostructure.

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KHASIN, G.A.; CHIKINA, V.G.; BOGDASHKIN, A.I.; RANNEV, G.G.; BRUNS, G.L.; VASHCHENKO, Yu.I.

Equipment for the hot drawing of deformation-resistant steel. Metallurg 7 no.2:33-35 F '62. (MIRA 15:3)

1. Zlatoustovskiy metallurgicheskiy zavod i Chelyabinskiy NIIM.
(Drawing (Metalwork)--Equipment and supplies)

S/133/62/000/009/007/009
A054/A127

AUTHORS: Khasin, G.A., Davidyuk, V.N.

TITLE: At the Zlatoustovskiy metallurgicheskiy zavod (Zlatoust Metal-lurgical Plant)

PERIODICAL: Stal', no. 9, 1962, 849

TEXT: 30-kg ingots and wire rods of H42 (N42) and X23H18 (Kh23N18) steel were tested. Smelting took place in an h-f induction furnace with the addition of cerium in the form of ferrous cerium and cerium dioxide. These additives did not affect the macrostructure of the test steels in the cast as in the forged condition. Raising the temperature to 1,200°C increased the ductility of both grades; beyond this temperature the ductility was reduced. In the N42 grade the ductility decreased in proportion to the amount of cerium. The ductility was not affected when ferrocerium was added to the Kh23N18 grade in an amount to ensure a 0.05 - 0.20% cerium content, neither did the addition of cerium dioxide with a 0.05 - 0.15% cerium content, at 1,100 - 1,150°C change the steel proper-ties. The latter improved, however, when 0.20% Ce was added. The ductility of Kh23N18 steel at 1,200°C increased considerably, when cerium dioxide (0.05 - 0.20% Ce), was added.

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S/133/62/000/009/008/009
A054/A127

AUTHORS: Khasin, G.A., Davidyuk, V.N.

TITLE: At the Zlatoustovskiy metallurgicheskiy zavod (Zlatoust Metallurgical Plant)

PERIODICAL: Stal', no. 9, 1962, 854

TEXT: In cooperation with the NIIMetiz and the Chelyabinskiy nauchno-issledovatel'skiy institut metallurgii (Chelyabinsk Scientific Research Institute of Metallurgy) a method has been developed for hot drawing packs of high-speed steels. Before starting the process, the drawing dies are heated to 350°C; the metal is heated in a lead bath. A mixture of silver graphite and saw dust in a proportion of 3 : 1 is applied for coating. Hot drawing increased the output of the drawing equipment by a factor of 1.7, reduced the annealing time by a factor of 2.9, the labor required for 1 ton finished product by 9.6 man-hours, the operation cycle by 37.2 hours and production cost by 177.63 rubles/ton. 2) A technology for obtaining calibrated and polished 1X21H5T (ЭИ811) [1Kh21N5T (EI811)] steel has been introduced. The steel is

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cast into 2.7 and 1 ton ingots. The billets are made from the large ingots by rough-rolling, from the small ones by hammering prior to rough rolling. The heat treatment of the metal and its preparation for drawing and polishing are carried out according to the technology for Х18Н10 (Kh18N10) steel. To prevent increased wear of the drawing dies, the reduction rate is 16 - 18%. The mechanical properties of the steel after polishing, annealing or hardening comply with Group I of ТУ 291-60 (TU 291-60).

VOINOV, S.G.; KOSOY, L.F.; SHUMOV, M.M.; SHALIMOV, A.G.; CHEKHOMOV, O.M.; ANDREYEV, T.B.; AFANAS'YEV, S.G.; KALINNIKOV, Ye.S.; Prinimali uchastiye: KORNEYENKOV, A.N.; GURSKIY, G.V.; BOKSHITSKIY, Ya.M.; PETROV, A.K.; MOKHIR, Ye.D.; KOLYASNIKOVA, R.I.; KHASIN, G.A.; DANILIN, V.P.; PLEKHANOV, P.S.; MAZUN, A.I.; MARKIN, A.A.

Refining converter steel in the ladle with liquid synthetic slag. Stal' 22 no.3:226-232 Mr '62. (MIRA 15:3)
(Steel—Metallurgy)

SERGEYEV, G.N., inzh.; KHASIN, G.A., inzh.; DAVIDYUK, V.N., inzh.

Use of flat ingots of alloyed steel. Stal' 22 no.4:309-312 Ap '62. (MIRA 15:5)

1. Chelyabinskiy sovnarkhoz i Zlatoustovskiy metallurgicheskiy zavod.
(Steel ingots)

KHASIN, G.A.; DAVIDYUK, V.N.

Research carried out at the Zlatoust Metallurgical Plant.
Stal' 22 no.9:813, 849, 854 S '62. (MIRA 15:11)
(Zlatoust--Metallurgical research)

KHASIN, G.A.; DAVIDYUK, V.N.

At the Zlatoust Metallurgical Plant. Stal' 22 no.10:946 0'62.
(MIRA 15:10)

(Zlatoust—Metallurgical research)

EAAKASHVILI, V.S.; TARNOVSKIY, I.Ya.; KHASIN, G.A.

Plasticity of heat-resistant and stainless steels and alloys at high temperatures. Soob. AN Gruz. SSR 28 no.2:211-216 F '62. (MIRA 15:3)

1. AN GruzSSR, Institut metallurgii, Tbilisi. Predstavleno akademikom F.N.Tavadze.
(Metals--Heat treatment) (Plasticity)

KHASIN, G.A.

For a close connection between metallurgical laboratories and plants. Zav.lab. 28 no.10:1264-1265 '62. (MIRA 15:10)

1. Nachal'nik TSentral'noy zavodskoy laboratorii Zlatoustovoskogo metallurgicheskogo zavoda.
(Metallurgical laboratories)

KHASIN, Gersh Aronovich; OKHRIMOVICH, Boris Pavlovich; DAVIDYUK, Viktor nikolayevich; ROZIN, Bentsian Borisovich; GEYFMAN, Roma Samuilovich; MIKHAYLOVA, Ye.P., red.izd-va; OBUKHOVSKAYA, G.P., tekhn. red.

[Pouring of alloyed steel with the use of petrolatum]Razlivka legirovannoi stali s petrolatumom. Moskva, Metallurgizdat, 1963. 44 p. (MIRA 16:3)
(Steel ingots) (Metalworking lubricants)

ACCESSION NR: AR4027664 S/0277/64/000/002/0012/0012

SOURCE: RZh. Mashinostroitel'ny*ye materialy*, konstruktsii i raschet detaley mashin, Abs. 2.48.78

AUTHOR: Tarnovskiy, I. Ya.; Lyashkov, V. B.; Baakashvili, V. S.; Khasin, G. A.

TITLE: The ductility and resistance to deformation of alloyed brands of steel and alloys at high temperatures

CITED SOURCE: Tr. Ural'skogo n.-i. in-ta chern. met., v. 2, 1963, 146-152

TOPIC TAGS: ductility, deformation, alloyed steel, alloy, high temperature, austenitic steel, true stress, tensile strength, alloy steel ductility, steel deformation resistance

TRANSLATION: The author determined the mechanical properties of alloyed steel for a number of brands when tested for tensile strength at 800-1,200C. The true resistance of steel of all brands diminishes 6 — 10 times with a growth in temperature and levels off at 1,250C, reaching about 2 kg/mm^2. The alloy EI 435 and austentic EI-478 brand steel are characterized by the highest true

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ACCESSION NR: AR4027664

resistance to deformation at 800--1,000C. The most intensive drop in the actual stress for alloys and austenitic steels is observed in the interval 800--1,000C. Typical of these brands is the continual rise in the plastic characteristics delta and psi with a rise in temperature. Six illustrations. Bibliography of 4 titles.

DATE ACQ: 06Mar64 SUB CODE: ML ENCL: 00

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S/130/63/000/003/001/001
A006/A101

AUTHORS: Khasin, O. A., Yermanovich, N. A., Pribytkova, K. N.

TITLE: Improving the ductile properties of high-chromium steels

PERIODICAL: Metallurg, no. 3, 1963, 27 - 29

TEXT: The authors studied the effect of hot deformation temperature, cooling methods after rolling, and variants of heat treatment upon the ductile properties of high-chromium steels. Square and round specimens were subjected to the following variants of forging, heat treatment and cooling: preheating for forging from 1,000 - 1,200°C; forging completed at 700 - 940°C; heat treatment at 780 and 900°C during 4 hours; quenching in water and air. It was found that the ductility of steel, determined from the magnitude of contraction after forging, increased with lower forging temperatures. A considerable increase in ductility occurs when the temperature of completed forging is below 800°C. There was no marked difference between the properties of metals, cooled after forging in air, water and cinder. Heat treatment of forged metal at 780°C for 4 hours and cooling in water raises considerably the ductility of the steel and is re-

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commended for steels which do not possess the required ductile properties after forging and rolling. Changes in the microstructure, depending upon heat treatment conditions, were studied by heating square steel specimens to temperatures ranging from 700 - 1,100°C with different holding time, and cooling with the furnace, in air or in water. After heat treatment at over 800°C, the ductile properties of the steel remain low; they are normal at 780°C heating for 4 - 5 hours. There are 3 figures and 2 tables.

ASSOCIATION: Zlatoustovskiy metallurgicheskiy zavod (Zlatoust Metallurgical Plant)

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721910008-3"

The object of the present investigation was to deter- ... effect of the degree of deformation, temperature, and ... rates on the magnitude of stress required to plastically ... steels ЭИ 481 (EI 481), ЭИ 478 (EI 478), Х15Н60 (Kh15N60), ЭИ 388 (EI 388), ЭИ 811 (EI 811) and ЭИ 736 (EI 736) at elevated temperatures. Cylindrical test pieces were deformed on a hydraulic press or on drop forging machines, the strain rates in the latter case being 0.05, 7.5, and 150 sec^{-1}. The forging force was measured with the aid of elastic dynamometers with wire resistance strain gauges, and recorded by oscillographs. Conclusions. 1) The resistance, σ, of steels studied to deformation, increases with increasing degree of deformation, ε, in a manner demonstrated in Fig.1, where σ (kg/mm^2) of steels

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The resistance of heat-resistant ... S/148/63/000/003/004/007
E193/E183

Kh15N60 and EI 481 is plotted against ε; the various curves were constructed for specimens deformed at a strain rate of 7.5 sec^{-1} at the following temperatures: 1 - 900 °C; 2 - [illegible] °C; 3 - 1100 °C; 4 - 1200 °C. Other conditions being equal, the degree of work-hardening increases with increasing content of the [illegible] additions. 2) In Fig.2 the log of stress (σ, kg/mm^2) [illegible]

...resistant ...

(2)

S/133/63/000/003/007/007
A054/A126

AUTHORS: Khasin, G.A., Chikina, V.G., Kashin, Yu.A.

TITLE: Hot drawing of bundle steel

PERIODICAL: Stal', no. 3, 1963, 271 - 273

TEXT: In the cold drawing process of P 18 (R18), P 9 (R9) and 9 X18 (9Kh18) high-alloy, low-ductility grades the wire rods have to be subjected to intermittent heat treatment. To eliminate this cumbersome procedure, the Zlatoustovskiy metallurgicheskiy zavod (Zlatoust Metallurgical Plant) draws these steels in heated condition (since 1952). The first method of heating (by electric contact) produced sometimes local overheating of the wire, which resulted in ruptures. Therefore, another method was established by which the metal is heated prior to drawing in a lead bath (5,860 mm long, containing 2 t molten lead, heated by a 75 kw current). The bath temperature is 350 - 370°C, the metal is heated to 290 - 330°C, while just before the calibration its temperature is 300°C. The R18 wire rods are drawn by 34, 62, 76.5 and 81.5%, the 9Kh18 ones by 66.5% in total. The optimum drawing rates ensuring the required heating of

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Hot drawing of bundle steel

S/133/63/000/003/007/007
A054/A126

the metal are given. Prior to the intercalated lead-bath heating process, the wire rods are subjected to the conventional heat treatment. The wires produced by hot drawing have a bright surface, the same microstructure as cold-drawn ones, the aquadag coat applied to the metal surface before it is passed through the lead bath prevents it from being decarburized and oxidized. The mechanical characteristics of the hot-drawn steel wires are satisfactory, both grades maintain their ductility even at high deformation rates. The new method raised the output of the drawing equipment by a factor of 2; the elimination of intermediate annealing processes saves 315 kwh/t, while the primary costs for drawing 1 ton of steel decreased by 177.63 rubles. According to an Editorial Note the drawback of this method is that it requires much lead and a very good ventilation to remove the noxious lead vapors. It seems to be preferable to heat the wire rods by induction, as introduced in the Zavod Proletarskiy Trup (Proletarian Work Plant) and now under investigation at the ZMZ. The lead-bath method was developed in cooperation with S.P. Petukhov (Deceased), R.I. Valentova, G.G. Rannev, et al. The X-ray analysis of lead-bath heated wires was carried out by I.A. Brazgin. There are 2 figures.

ASSOCIATION: Zlatoustovskiy metallurgicheskiy zavod (Zlatoust Metallurgical Plant) and NIIMETIZ

Card 2/2

DATE ACQ: 26Aug63

ENCL: 00

TITLE: a) Plasticity improvement in steel EI256 16
b) Development of the supersonic inspection method and the expansion of its applications

SOURCE: Stal', no. 8, 1963, 747

TOPIC TAGS: steel EI256, plasticity, supersonic inspection, defect, defectoscope, vibration frequency

[illegible] a) Satisfactory results were obtained when a metal strap 100x10 mm was heated and soaked for 5 hours at 950C, then chilled in water. At the end of rolling [illegible] should be 900C.

[illegible] Defects in fine-grained metal are best detected by defectoscopes at the frequency of 2.5 megahertz. When zones of coarse grains are present, the [illegible] should be 1.5 megahertz. It is proper to use a frequency of 1.5 megahertz instead of 1.8 for the apparatus UDM-1M.

...ovskiy metallurgicheskiy...

OTHER: 000

KHASIN, G.A.; BRAZGIN, I.A.; SINENKO, E.N.; MUNDER, P.L.

Carbide phase in R18 steel. Metalloved. i term. obr. met. no.11:40 N '63. (MIRA 16:11)

1. Zlatoustovskiy metallurgicheskiy zavod.

KHASIN, G.A.; VACHUGOV, G.A.; MENUSHENKOV, P.P.; POSYSAYEVA, L.I.; MEDOVAR, B.I.; MAKSIMOVICH, B.I.

Production of EI736 and EI961 steel by the electric slag remelting method. Avtom. svar. 16 no.9:78-81 S '63. (MIRA 16:10)

1. Zlatoustovskiy metallurgicheskiy zavod (for Khasin, Vachugov, Menushenkov, Posysayeva). 2. Institut elektrosvarki im. Ye.O. Patona AN UkrSSR (for Medovar, Maksimovich).

~~KHAYIN, G.A.~~; CHIKINA, V.G.; KASHIN, Yu.A.; Prinimali uchastiye: PETUKHOV, S.P. [deceased]; VALENTOVA, R.I.; RANNEV, G.G.

Warm drawing of steel wire. Stal' 23 no.3:271-273 Mr '63. (MIRA 16:5)

1. Zlatoustovskiy metallurgicheskiy zavod i Nauchno-issledovatel'skiy institut metiznoy promyshlennosti.

(Wire drawing)

SERDYUKOV, G.V., inzh.; KHASIN, G.A.; DAVIDYUK, V.N.

New developments in research. Stal' 23 no.8:719-720 Ag '63.
(MIRA 16:9)

(Steel--Metallurgy)

SERDYUKOV, G.V., inzh.; KHASIN, G.A.; DAVIDYUK, V.N.

New developments in research. Stal' 23 no.8:747 Ag '63.
(MIRA 16:9)
(Physical metallurgy)

KHASIN, G.A.; DAVIDYUK, V.N.

New developments in research. Stal' 23 no.9:810 S '63. (MIRA 16:10)

KHASIN, G.A.; KOLYASNIKOVA, R.I.; VACHUGOV, G.A.; BOYARSHINOV, V.A.; GAVRILOV, O.T.; ALEKSEYENKO, M.F.; MELIKHOV, P.I.; VYBORNOV, A.F.

Electric slag refining of stainless, heat-resistant steel. Stal' 23 no.10:908-910 O '63. (MIRA 16:11)

MEN'SHENKOV, P.P.; KHASIN, G.A.; VACHUGOV, G.A.; KRYLOV, S.M.; Prinimali uchastiye: KOLYASNIKOVA, R.I.; POCHEKOVSKIY, R.A.; ANTROPOV, O.F.

Improving the macrostructure and reducing nonmetallic inclusions in the electric slag refining of alloyed steel. Stal' 23 no.12:1110-1112 D '63. (MIRA 17:2)

1. Zlatoustovskiy metallurgicheskiy zavod.

ACCESSION NR: AP4029831 S/0279/64/000/002/0026/0030

AUTHOR: Khly*nov, V. V. (Sverdlovsk-Zlatoust); Yesin, O. A. (Sverdlovsk-Zlatoust); Khasin, G. A. (Sverdlovsk-Zlatoust); Vachugov, G. A. (Sverdlovsk-Zlatoust); Sorokin, Yu. V. (Sverdlovsk-Zlatoust)

TITLE: On the mechanism of extracting nonmetallic impurities from steel drops in slag

SOURCE: AN SSSR. Izv. Metallurgiya i gornoye delo, no. 2, 1964, 26-30

TOPIC TAGS: ShKh-15 steel, ANF-6 slag, EI-736 steel, impurity, extraction

ABSTRACT: The authors investigated the passing of ShKh-15 steel drops through a layer of fused ANF-6 slag and its purification from non-metallic impurities. The amount of large impurities decreased during this process to a greater degree than did the fine impurities. Impurities larger than 10 μ, present in the initial metal, disappeared completely. This cannot be the result of flotation, since the metal of the mobile drop was intensely agitated. It was experimentally shown that the content of solid, non-metallic impurities in ShKh-15 and EI-736 steels decreased by passing drops through an ANF-6 slag layer. The content of the impurities decreased with an increase of the path length in accordance with the law of attenuation.

ACCESSION NR: AP4029831

Larger impurities were extracted faster than fine impurities. The higher the impurity concentration, the more rapidly they were eliminated from the metal. The impurity content in large drops fell slower than in fine drops. The obtained regularities were qualitatively and quantitatively clear, stemming from a definite mechanism impurity extraction. It was assumed that the internal eddy movements of the impurity delivers the drops to the surface layer which remained there without returning into the metal. Orig. art. has: 3 figures and 2 formulas.

ASSOCIATION: none

SUBMITTED: 18Oct63 DATE ACQ: 30Apr64 ENCL: 00

SUB CODE: ML NO REF SOV: 008 OTHER: 000

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721910008-3"

ACCESSION NR: AP4042507 S/0182/64/000/007/0009/0012

AUTHOR: Tarnovskiy, I. Ya.; Baakashvili, V. S.; Khasin, G. A.

TITLE: Mechanical properties of martensitic and austenitic-ferritic steels

SOURCE: Kuznechno-shtampovochnoye proizvodstvo, no. 7, 1964, 9-12

TOPIC TAGS: martensitic steel, austenitic ferritic steel, heat resistant steel, stainless steel, high speed steel, steel mechanical property, steel heating method

ABSTRACT: A study is made of the deformation resistance of heat-resistant stainless steels at various temperatures and deformation rates following various types of heat treatment. Cylindrical specimens (diameter-to-length ratio, 0.8) of EI-347sh (sh — electroslag melted), EI-992, EI-961 (AISI-422), 5Kh4SV4MF, and R-18 (AISI-TI) martensitic steels and EI474 (AISI-414), 08Kh20N10G6, 08Kh19N9S2F2, and OKh21N6M2T austenitic-ferritic steels were upset at 900, 1000, 1100, or 1200C, with deformations of 15, 25, or 40% and deformation speeds

ACCESSION NR: AP4042507

of 0.05, 7.5, or 150 sec^{-1}. Test specimens were either heated to the test temperature, held for 10 min, and then upset, or heated to a higher temperature (1200C), held for 10 min, furnace cooled to the test temperature and held there for 10 min, and then upset. The high-speed R-18 and EI-347 sh steels and the high-carbon EI-992 martensitic steel had high deformation resistance at all deformation speeds. The deformation resistance of the martensitic steels increased at a higher rate and was higher in magnitude when heated by the second method. For the EI347 sh steel upset 30% at 900C, the difference in the absolute magnitude was about 10% and 5% at deformation speeds of 0.05 sec^{-1} and 7.5 sec^{-1}, respectively. The difference decreases with increasing test temperature. Similar behavior was observed in the EI-992 steel. In contrast, the increase in the deformation resistance of the austenitic-ferritic steels heated by any method is practically the same. The higher deformation resistance of martensitic steels heated by the second method is explained by the presence of W, V, Mo, and Cr carbides, which at 1200C partially dissolve and strengthen the γ-solid solution. Orig. art. has: 4 figures and 1 table.

Card 2/3

KHLYNOV, V. V.; SOROKIN, Yu. V.; YESIN, O. A.; KHASIN, G. A.; VACHUGOV, G. A.

Character of the movement of steel drops in slag. Izv. vys.ucheb. zav.; chern.met.7 no. 5:22-25 '64. (MIRA 17:5)

1. Ural'skiy politekhnicheskiy institut i Zlatoustovskiy metallurgicheskiy zavod.

KHLYNOV, V.V.; YESIN, O.A.; KHASIN, G.A.; VACHUGOV, G.A.; SOROKIN, Yu.V.

Mechanism of the removal of nonmetallic inclusions from drops of steel moving in slag. Izv. AN SSSR Met. i gor. delo no.2: 26-30 Mr-Ap'64 (MIRA 17:8)

POKSEVATKIN, M. I.; TARNOVSKIY, I. Ya.; LEVANOV, A. N.; KHASIN, G. A.

Contact stresses during the hot upsetting of carbon and alloyed steels. Izv. vys. ucheb. zav.; chern. met. 7 no.6:103-108 '64. (MIRA 17:7)

1. Ural'skiy politekhnicheskiy institut.

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721910008-3"

ACCESSION NR: AP4023080 S/0251/64/033/002/0383/0389

AUTHORS: Tarnovskiy, I. Ya.; Khasin, G. A.; Baakashvili, V. S.

TITLE: Plasticity of some high alloy steels and alloys at high temperature

SOURCE: AN GruzSSR. Soobshcheniya, v. 33, no. 2, 1964, 383-389

TOPIC TAGS: steel, high-alloy steel, stainless steel, plasticity, temperature effect on plasticity, 0Kh23Yu5 ferrite steel, 08Kh20N10G6 austenite steel, EI602 heat-resistant alloy, Ni alloy, EI347Sh high-speed steel, EI961 chromium steel, heat-resistant steel, EI474 chromium stainless steel, Ni-Mn steel, structure, phase transformation

ABSTRACT: Seven types of high-alloy steels and alloys were studied by the standard tension test and impact bending test (at high temperature) in order to determine their plasticity. The materials tested were: 08Kh20N10G6 austenite steel, EI961 chromium heat-resistant steel, EI474 chromium stainless steel, 5Kh4SV4MF heavy duty steel, EI347Sh high-speed steel, EI602 heat-resistant alloy, and 0Kh23Yu5 ferrite alloy. The chemical composition of these metals was chosen in such a way that both the comparatively homogeneous and the two-phase steel structures were

ACCESSION NR: AP4023080

represented. Samples were heated in two ways: 1) they were brought to and held at the testing temperature for 10 minutes before being tested; 2) they were heated to 1200C and held at that temperature for 10 minutes, and were then cooled in the oven to the testing temperature. The article presents the relative advantages and disadvantages of the two testing techniques. The authors indicate a preference for the second procedure which gives more accurate results when applied to the two-phase metals. In the case of homogeneous metals both testing procedures produced similar results. Orig. art. has: 2 tables and 5 figures.

ASSOCIATION: Akademiya nauk Gruzinskoy SSR, Institut metallurgii, Tbilisi (Academy of Sciences, Georgian SSR, Institute of Metallurgy)

SUBMITTED: 22Jan63 DATE ACQ: 10Apr64 ENCL: 00

SUB CODE: ML NO REF SOV: 006 OTHER: 000

Card 2/2

SHVED, F.I.; KHASIN, G.A.; DOLININ, D.P.; KARYAKIN, A.I.; VEKSLER, G.[illegible];
BAKHTIAROV, N.F.

Crystallization and structure of an ingot made by vacuum arc melting.
Stal' 24 no.9:809-812 S '64.
(MIRA 17:10)

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improving the [illegible]
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[illegible] and [illegible]
... Metallurgical Plant

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721910008-3"

KHASIN, G.A.; DAVIDYUK, V.N.; FRANTSOV, V.P., inzh.; KHITRIK, A.I., inzh.; MATVEYEV, Yu.M.; VARNAVSKIY, I.; RYSYUKOV, N.; ZHURAVLEV, S.

New developments in research. Stal' 24 no.10:880, 898, 909, 917, 930, 942, 946 O '64. (MIRA 17:12)

TARNOVSKIY, I.Ya.; KHASIN, G.A.; BAAKASHVILI, V.S.

Plasticity of some high-alloy steels and alloys at high temperatures. Soob. AN Gruz. SSR 33 no. 2:383-389 F '64. (MIRA 17:9)

1. Institut metallurgii AN GruzSSR, Tbilisi. Predstavleno akademikom F.N.Tavadze.

AP5003495

Shved, F.I.

parameters

metallurgiya

... AP4005495

... the liquid bath (from ... The rates ... corresponding to currents of ... kg/min. respectively. The origins of the formation of the so called "dense spo... in vacuum ... steel ShKh15 are described. Orig. art. has: 6 figures, 4 formulas and 1 table.

... metallurgi... works ... issledovatel'skiy ... metallurgical ... institute)

... 2 Mar64 ENCL: ...

OTHER: ...

Khasin, G. A.

high-frequency current heat

-drawn steel at the

-ekonomicheskaya inf

frequency heating, induction

steel, recrystallization

annealing furnace

dispense with the

from the rapid heat

decarburized steel

with an installation

The high-frequency installation

frequency 2500 cps.

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721910008-3"

BABIY, A.S.; TOL'SKIY, A.A.; KHASIN, G.A.; DAVIDYUK, V.N.

New developments in research. Stal' 25 no.8:739 Ag '65.
(MIRA 18:8)

KRAVCHENKO, V.A., kand. tekhn. nauk; TERNOVSKIY, A.N., inzh.; KHASIN, G.A.; DAVIDYUK, V.N.

New developments in research. Stal' 25 no.8:818-819 S '65. (MIRA 18:9)

SHUSHLEBIN, B.A., inzh.; MATSEPON, Yu.A.; KHASIN, G.A.; DAVIDYUK, V.N.

New developments in research. Stal' 25 no.8:824 S '65. (MIRA 18:9)

(N) L 11790-66 EWT(m)/EWA(d)/EWP(t)/EWP(z)/EWP(b) IJP(c) WJH/JD

ACC NR: AP6001683 SOURCE CODE:

AUTHOR: ...inin, D. P.; Morozov, A. N.; Khasin, ... A. ...

ORG: Chelyabinsk Scientific Research Institute of Metallurgy (Chelyabinskiy nauchno-...skiy institut metallurgii); Zlatoust Metal...

TITLE: Removal of oxygen and nitrogen in vacuum arc melting of ShKh15 steel

SOURCE: ...Chernaya metallurgiya, no. 12, 1965, 57-63

TOPIC TAGS: steel, chromium steel, ball bearing steel, steel melting, vacuum arc melting, steel refining, steel degassing, oxygen removal, nitrogen removal/ShKh15 steel

ABSTRACT: The behavior of oxide and nitride inclusions and the mechanism of the ... oxygen and nitrogen from ShKh15 (AISI E52100) ... steel ... vacuum ... oxygen and nitrogen ... and from 0.0084 ... initial content of Al_2O_3 and SiO_2 inclusions decreased from 0.0040 and

Card 1/2 UDC: 669.141.247.083.4.054

0.002... to 0.00060% each after the first remelting, and to ... and ... 26% ... and ... Oxygen and nitrogen are removed for the most part as oxide and ... particles. Hence, a more complete refining can be ... by promoting ... the initial metal ... with ... weight ... interphase energy at the metal-inclusion interface. The high-alumina inclu... are formed by the deoxidation of the initial metal with an increased ... aluminum enjoy these properties. Removal of ... inclusions is pro... by lowering to a minimum (0.002—0.003% the content of titanium in the initial ... art. has 3 figures and 4 tables. [MS]

SUB CODE: 11/ SUBM DATE: 15Jul64/ ORIG REF: 005/ OTH REF: 001 ATD PRESS: 4178

L 27432-66 EWT(m)/EWA(d)/EWP(t)/ETI IJP(c) JD

[illegible] ; Davidyuk, V. N.

SOURCE: Stal', no. 9, 1965, 819

TOPIC TAGS: steel, vacuum melting, induction furnace, vacuum furnace, argon, [illegible], steel structure, titanium/OKh18N12T steel

ABSTRACT: The melting of grade OKh18N12T steel in vacuum induction furnaces and subsequent pouring into ingots weighing (mass 0.5 ton [illegible]grams in an [illegible] atmosphere provides satisfactory ductility of metal [illegible] the [illegible] [illegible] the periphery [illegible] of the specimens are a basic defect [illegible] structure.

[illegible] SUBM DATE: none

Card 1/1 90

UDC: 669.187.2.083.4 : 621.365.5.001.5

L 27435-66 EWT(m)/EWA(d)/EWP(t)/EII IJP(c) JD
ACC NR: AP6017775 SOURCE CODE: UR/0133/65/000/009/0819/0819

AUTHOR: Khasin, G. A.; Davidyuk, V. N.

ORG: Zlatoust Metallurgical Plant (Zlatoustovskiy metallurgicheskiy zavod) 43 B

TITLE: Vacuum arc melting of 30KhGSNA steel

SOURCE: Stal', no. 9, 1965, 819 18

TOPIC TAGS: vacuum melting, steel, manganese, silicon, steel structure, nonmetallic inclusion, solid mechanical property/30KhGSNA steel

ABSTRACT: Melting was done in a 380-mm diameter crystallizer with a current strength ranging from 5 to 5 ka. Loss of manganese and silicon amounted to 34% and 6.5% respectively. Steel quality as to macrostructure, contamination with nonmetallic inclusions, and mechanical properties satisfied requirements of technical specifications. [JPRS]

SUB CODE: 11, 13, 20 / SUBM DATE: none

Card 1/1 UDC: 669.187.2.083.4 : 621.365.2.001.5